

Normalized Metered Energy Consumption Working Group Recommendations for Population-Level Approaches

Executive Summary

Between May and June 2019, the California Public Utilities Commission (CPUC) and Pacific Gas and Electric Company (PG&E) organized a working group of energy efficiency stakeholders with support from Common Spark Consulting. The working group was convened pursuant to an *Administrative Law Judge's Ruling on Certain Measurement and Verification Issues, Including for Third Party Programs* dated January 31, 2019, which directed Commission staff to convene a working group on normalized metered energy consumption (NMEC) methods for calculating programs' energy savings. During May and June 2019, the working group's objective was to provide input to Commission staff developing rules and guidance for programs that leverage NMEC methods to calculate savings at the population level, with a focus on enabling the use of NMEC methods in third party programs expected to launch in 2020.

Working group participants from program administrators (investor-owned utilities, community choice aggregators), third-party implementers, evaluators, and non-governmental organizations volunteered their time and effort over the course of six weeks to prioritize issues to address and prepare straw proposals. Categories of topics prioritized for guidance included:

1. Defining population-level NMEC and aggregate population eligibility
2. Modeling issues such as baseline definition, normalization, comparison groups, exogenous factors, non-routine events, and "outlier" sites
3. Process, roles, review, and evaluation

Working group participants identified measure-level analysis (including lifecycle savings and effective useful life) and net-to-gross values for NMEC programs as issues for which interim guidance exists, but which should be revisited in the near term to discuss alternative approaches. Topics raised and deferred to a later date included claiming impacts beyond energy savings with NMEC (e.g., demand response or other load-shaping interventions); addressing challenges of estimating energy efficiency program savings when distributed generation, storage, or electric vehicles are present; and additional pay-for-performance

program design considerations. Other topics raised included metered energy consumption data access, which the CPUC is addressing in a separate proceeding; and sampling and extrapolating savings, which participants noted falls outside of the definition of NMEC as an approach that uses participants' observed metered energy consumption data.

Recommendations resulting from working group discussion and collaboration are summarized in the following table.

Topic	Recommendation
Definition of Population NMEC	<p>Population NMEC is an energy savings calculation approach in which results are based on energy usage data observed at the meter, and aggregated across a portfolio/program/population rather than a modeled engineering forecast or deemed value.</p> <p>Characteristics of Population NMEC Programs include:</p> <ul style="list-style-type: none"> • For a Population NMEC program, M&V may aggregate savings estimates from a group of sites where savings from all sites are calculated using the same modeling and analysis methods; or use a pooled approach with a single model to estimate average savings across the population. • Using a consistent modeling approach to measure savings across all sites within a specific program means that the same data collection, data processing, and analytical methods are applied to all participating sites used to obtain the aggregate result for a specific program. • Data from all participating sites are collected and prepared for analysis the same way; the same data are collected from all sites; and data are treated consistently during data cleaning (i.e., the same rules are used to determine outliers or fill data gaps). Values of individual variables may differ across sites. • Population NMEC programs are those in which savings are claimed for an aggregate or portfolio of sites with similar characteristics.
Aggregate Population Eligibility	<p>Working group recommendations include:</p> <ol style="list-style-type: none"> 1. To use a population NMEC approach, the forecasted number of sites, projected savings, and projected baseline model error for individual sites should be sufficient that fractional savings uncertainty (FSU) for the group of sites as a whole is not predicted to exceed 25% at a 90% confidence level, otherwise the implementer and program administrator should seek an exception from the CPUC.¹ Commission staff, in collaboration with

¹ Commission staff will need to direct implementers and program administrators to the formula to be used in calculating FSU and/or develop more detailed guidelines about FSU calculations. Some working group participants pointed out that the FSU formulas in ASHRAE Guideline 14, which were originally developed for models using monthly and daily data, may underestimate the uncertainty of models that use hourly energy usage data.

	<p>stakeholders, should re-evaluate the 25/90 FSU/confidence threshold after NMEC programs have been implemented and operational for one year.</p> <ol style="list-style-type: none"> 2. The Rulebook should specify that this eligibility threshold applies only to population-level NMEC at the whole-group level, and not site-level NMEC or individual sites within a population-level NMEC group. 3. Implementers, program administrators, and evaluators should use only daily or monthly, and not hourly, data when estimating FSU using guidance in ASHRAE Guideline 14. They may estimate FSU for hourly data using other methods that account for autocorrelation and other issues specific to hourly data. 4. Commission staff should conduct, or delegate to program administrators to conduct, a study on the reasonableness of this threshold and alternate eligibility options. 5. Commission staff should allow implementers and/or program administrators to propose programs with a higher FSU and/or lower confidence level, which would be subject to additional review by Commission staff. If such a program is proposed, implementers and/or program administrators would need to demonstrate how the threshold addresses risks to realizing savings.
Model/Methodology Transparency and Access	Any methodology, including calculations used, should be available for verification, replication, and evaluation. At a minimum, a methodology must be available for the aforementioned testing and verification activities. The methodology should have demonstrated performance based on a generally accepted testing and/or validation methodology.
M&V Plan and Template	The working group did not recommend an M&V template at this time. However, in the M&V plan, program administrators and/or implementers should describe how raw data will be processed into a result. The M&V plan should also discuss why the program is appropriate for population-level NMEC, and why the calculation methodology and variables used for normalization are appropriate for the program and type of sites treated.
M&V Thresholds for Population-level NMEC Programs	<p>Criteria to consider in an M&V plan include:</p> <ul style="list-style-type: none"> • <u>Normalizing for Weather and other Factors</u>: How does the program normalize for weather? Does the program also normalize for other factors? If so, how? • <u>Comparison Groups and Baseline</u>: Does the program utilize a comparison group? If so, for what purposes? How is the comparison group composed? How will comparison group data be collected? • <u>Outlier Site Identification and Treatment</u>: Under what condition(s) will a site be excluded from a population-based program after enrollment, and who should get to decide? Describe any impacts of outlier identification and treatment on savings determinations and/or implementer compensation.

	<ul style="list-style-type: none"> • <u>Non-Routine Events Identification and Treatment</u>: How does the program account for NREs and adjustments (if at all), what are the magnitudes of adjustments, and what types of change(s) to building use or other factors will qualify for allowing a non-routine adjustment to be made? What type of documentation and verification will be required for a non-routine adjustment, what criteria will be used to determine whether the adjustment or treatment it is sufficient? • <u>Program Risks and Risk Management</u>: What are the potential risks to this population NMEC approach? How do the M&V approach, modeling, and other program activities address risks of not realizing savings or overpaying for savings? Do payable savings differ from claimable savings? If so, why is this appropriate and how do program activities or program design (e.g., site exclusion/outlier site protocol established up-front, rules on eligibility, use of a comparison group or other basis for adjustments) address risk?
Forecasting, Reporting, and Claiming Savings	<p><u>Forecasting Savings</u>: Prior to program launch, program administrators must forecast program savings for planning and cost-effectiveness purposes. In order to forecast Effective Useful Life (EUL) and demonstrate how the program would achieve projected impacts, forecasted savings may include measure-level savings values and installation rates. Forecasted savings should be a best estimate that could be based on sources including DEER values, engineering estimates, information from prior program years, and/or other transparent sources as they become available.</p> <p><u>Reporting and Claiming Savings</u>²: After program launch, program administrators report savings to the CPUC prior to formal evaluation, measurement, and verification (EM&V). Program-level savings should be reported in program administrators' Quarterly and Annual Reports.</p> <p>NMEC savings claims are expected to be based on at least 12 months of post-installation usage data. However, in the year in which installation is completed, but before one year of post-installation data are available, options for CPUC to consider for reported savings include:</p> <ul style="list-style-type: none"> • Using the forecasted values identified for planning purposes, possibly discounted based on the predicted FSU; • Updating forecasted values by extrapolating interim NMEC results (e.g., based on number of installations to date) and expenditures; • Holding NMEC savings (and potentially costs) until one full year of post-installation data are available - note that current reporting requirements prescribe that program administrator costs are reported in the year they are incurred. If a savings claim is held while program money is spent and reported, program administrators' cost-effectiveness would be inaccurate.

² As of June 2019, the statewide Reporting Project Coordination Group (PCG), a forum for CPUC staff and program administrators, has also undertaken discussions of how NMEC savings should be reported.

	The CPUC may wish to set interim guidelines for claiming NMEC savings until a long-term process is identified.
Data	Stakeholders should move towards the use of common data sets for program management, savings claims, and CPUC-led ex post evaluation (and where possible, forecasting). Program administrators should maintain and manage the data on each of their programs (including usage and other data). Data should flow from the implementer forward through the program chain to the evaluator (as opposed to relying on the evaluator's data).
Pay-for-Performance	The CPUC should encourage pay for performance, an arrangement in which program administrators compensate implementers based on NMEC energy savings. However, there is no recommendation at this time on whether the CPUC should prescribe that a minimum proportion of implementer compensation must be pay-for-performance. The broader issue related to this recommendation is to minimize program risk and that increasing pay-for-performance program designs would decrease risk to ratepayers. Overall, implementers and program administrators should be considering which parties are subject to risks of overspending for savings or underperformance of realized savings and how those risks could be minimized.

Commission staff will refer to these recommendations as they update the *Rulebook for Custom Program and Projects Based on Normalized Metered Energy Consumption* (Rulebook) with guidance on population-level NMEC programs. The CPUC will issue the updated Rulebook for formal comment in proceeding A. 17-01-013 *et al.* All parties to the proceeding will have the opportunity to comment prior to staff's finalization of guidance.

The NMEC working group may continue to meet to discuss issues that were not addressed in this initial round of meetings. Stakeholders should refer to Commission staff on the timing and scope of potential future working group activities.

Introduction and Background

This report summarizes the context, discussion, and outcomes related to working group meetings on the use of normalized metered energy consumption (NMEC) methods for population-level analysis. Common Spark Consulting developed this report based on our understanding and interpretation of working group conversations and documentation developed to date. Common Spark Consulting applied a good faith effort to accurately and objectively represent participants' recommendations, but this report is not presented as a report collaboratively written by the working group. This report offers a foundation for Commission staff to leverage as they develop program rules for the use of NMEC methods. Program rules will be presented to parties for formal comment on the record.

The Role of Normalized Metered Energy Consumption in California Policy

As Californians work towards goals to double energy efficiency by 2030 and reduce greenhouse gas emissions by 80% of 1990 levels by 2050,³ NMEC approaches to calculate program savings offer several potential benefits to stakeholders. NMEC methods offer greater opportunities for program administrators to implement pay-for-performance program designs, may enable the capture of stranded savings and encourage deeper retrofits, and reduce reliance on averaged savings values. The broad use of NMEC methods, however, is relatively new in California's regulatory context, and measurement and verification (M&V) rules for their use are still under development.

Recent California Public Utilities Commission Direction on NMEC

In March 2018, the California Public Utilities Commission (CPUC) directed staff to develop and maintain rules and requirements applicable to NMEC approaches.⁴ Pursuant to that direction, Commission staff developed the *Rulebook for Custom Program and Projects Based on Normalized Metered Energy Consumption* (Rulebook) and posted it to the CPUC website.⁵ The Rulebook provides the most up to date rules established in Commission Decisions and Resolutions that apply to NMEC projects and programs. Commission staff is responsible for updating the Rulebook as additional guidance is issued and/or clarified.

In January 2019, the CPUC issued further guidance on NMEC methods in the *Administrative Law Judge's Ruling on Certain Measurement and Verification Issues, Including for Third Party Programs* (January Ruling). The January Ruling acknowledged that NMEC methods could apply to both site-level and population-level analyses. Because the Rulebook previously only

³ See Clean Energy and Pollution Reduction Act of 2015 (SB 350, De Leon) and Energy Efficiency Legislation (AB802, Williams)

⁴ *Administrative Law Judge's Ruling on Certain Measurement and Verification Issues, Including for Third Party Programs*, issued January 31, 2019.

⁵ Rolling Portfolio Program Guidance, see "Rulebook" under "Custom Programs and Projects Using Normalized Metered Energy Consumption at <http://www.cpuc.ca.gov/General.aspx?id=6442456320>

addressed site-level approaches, the January Ruling directed staff to “update the Rulebook to clearly distinguish site-level from population-level approaches, and to clarify the applicability of rules to each NMEC approach.”⁶ The January Ruling also directed Commission staff to lead a working group to “develop further rules and guidance for programs leveraging NMEC methods” and encouraged staff to prioritize population-level rules and technical guidance.⁷

Working Group Stakeholder Process

On May 6, 2019, Commission staff and PG&E convened the first working group meeting for NMEC approaches. PG&E enlisted Common Spark Consulting to facilitate the working group. The NMEC working group’s priority task for the May-June 2019 time frame was to focus on key guidance for population-level NMEC that could enable development of third party programs expected to launch in 2020. The NMEC working group scope extends beyond population-level NMEC guidance; however, pursuant to the January Ruling, this was the primary issue in this first phase of discussions.

For this initial effort on population-level NMEC, working group participants were asked to attend a set of meetings until mid-June, including small group working meetings. The working group objectives included defining population-level NMEC, identifying topics where guidance is needed, and developing draft recommendations where possible. Participants were asked to base recommendations on their own expertise and known best practices, propose interim guidelines and principles as needed, and identify areas for further study.

Additional working group meetings were held on May 15 (via webinar), June 4 (in-person at the CPUC), and June 12 (via webinar). Further, small groups met on May 29 and 30 to add detail to straw proposals. Appendix A of this report contains the meeting notes for the May 6, May 15, and June 4 working group meetings. Meeting presentations can be found on the CPUC’s website.⁸ The remainder of this report summarizes working group discussions and recommendations.

Identifying Topics Where Guidance is Needed

Following the May 6 meeting, stakeholders were invited to respond to an online survey to volunteer as a working group participant and identify categories of population-level NMEC guidelines (e.g., modeling guidelines) and specific issues and questions (e.g., baseline development) critical to address in the set of meetings until mid-June. Over 40 respondents identified a broad set of issues, which Common Spark Consulting consolidated into four priority buckets (Table 1), three next round buckets (Table 2), and issues to postpone for now (Table 3).

⁶ January Ruling, page 4.

⁷ Ibid, at page 1.

⁸ Normalized Metered Energy Consumption Working Group website, <https://www.cpuc.ca.gov/General.aspx?id=6442461286>.

Table 1. Proposed Priority Categories of Issues for Population-Level NMEC

Defining Population NMEC	Aggregate population eligibility	Comparison groups	Exogenous factors, NREs, Outlier sites
<ul style="list-style-type: none"> - Population-level vs. Site-level vs. Aggregate vs. RCT/experimental - Aggregating sites in the population using the same approach vs. pooled approaches or another approach? - Other Factors - Permissible project types or site types, qualifying measures (do they need to be the same?) - Expected savings impact 	<ul style="list-style-type: none"> - What is sufficient/needed to form a "population" – Quantity? Level of statistical power? - Significance of factors: <ul style="list-style-type: none"> - Savings claim (program level) - Cohort size - Building type/use - Building size/scale of energy use or savings - Model fit - Other factors? 	<ul style="list-style-type: none"> - When and/or why is a comparison group appropriate/necessary? - What risks/uncertainty does a comparison group mitigate? (e.g., exogenous factors?) <p>IF TIME:</p> <ul style="list-style-type: none"> - What are appropriate criteria for evaluating a matching approach? 	<ul style="list-style-type: none"> - When do NREs effectively cancel out in populations? What factors matter? - What approaches for identifying and addressing NREs are appropriate within a population-level program? - NREs vs. Outlier sites? - Outlier sites: What impact do outliers have at a population level? How are outlier sites identified and treated? - What should happen when a site becomes disqualified (e.g., due to an EV or solar)?

Table 2. Proposed Next Round Issues with Interim Recommendations

Net-to-Gross for NMEC	Measure-Level Analysis, Lifecycle Savings, EUL	Modeling, Baseline, Normalization	Process, Review, and Roles
<ul style="list-style-type: none"> - The CPUC has provided default values for NMEC programs (0.90 for non-residential, 0.85 for single-family residential, and 0.55 for multi-family residential) - Arguments and/or methodologies to propose any alternative NTG must be delineated fully in the M&V plan, and are subject to PA and CPUC review. 	<ul style="list-style-type: none"> - Past HOPPs and current P4P solicitations are accepting a weighted average EUL approach for estimated savings for NMEC proposals. (First-year savings are measured at the meter and lifecycle savings are based on First-year savings*weighted average EUL.) - Additional questions remain about when and how known longer persistence of savings might be claimed, beyond meter M&V. 	<ul style="list-style-type: none"> - What is normalized, in the context of population NMEC (Weather normalization? Other factors?) - Identify factors up-front that need to be adjusted to achieve common operating conditions across time periods 	<ul style="list-style-type: none"> - The goal is to provide standard requirements for M&V plans, that once approved by the PA, can be paid upon once the M&V implementation has been verified to match the pre-approved M&V. - Need to balance the risk of the implementers and the participants; what are factors that PAs and implementers should consider in balancing that risk? - In the interim: “Payable” savings – may be (for a number of factors) different than savings PAs claim

Table 3. Proposed Issues to Postpone

Meter Data Access, Click-Through	Sampling and Extrapolating Savings	Postponed Issues
<ul style="list-style-type: none"> - What barriers exist there for click-through and efficient data access, how do we overcome them? - How does the kind of data we retrieve from NMEC efforts drive our definition and approach of population level NMEC? <p><i>This is part of a separate proceeding. It can impact NMEC programs, but this group will not discuss it at this time.</i></p>	<ul style="list-style-type: none"> - Can sampling from site-level NMEC be used to estimate population level savings? - If so, how, and what is required to use a sample to make population estimates? <p><i>Short answer: no. This is essentially the foundation of deemed savings. NMEC is based on actual meter data from all participants. Sampling to estimate population-level savings will not be discussed.</i></p>	<ul style="list-style-type: none"> - Rules for calculating metered energy savings for solar customers. To be included in an NMEC program, solar production data would need to be available for analysis; current programs generally exclude solar customers. How to address EE vs. RE divide? - Opportunity to claim both EE and DR, other DER/load-shaping impacts from population-level NMEC programs? - Pay-for-Performance program design elements

During the May 15 meeting, working group participants reviewed the categories of issues and discussed whether the proposed order of prioritization was appropriate. Commission staff clarified that working group recommendations and resulting Rulebook updates apply to program filings and ex ante savings. Implementers and program administrators discussed the possibility that reliable and well-understood ex ante methods could allow more opportunity for ex post evaluations to study issues other than energy savings (e.g., effective useful life or measure cost). Program administrators also sought clarity on how working group discussions can inform third party implementer contract structures. Additional discussion resulted in the consolidation and reprioritization of issues into three priority buckets and two next round buckets. The issues to postpone remained the same. Table 4 summarizes the resulting categories of issues the working group addressed.

Table 4. Resulting Categories of Population-Level NMEC Issues

Priority	Next Round	Postpone for Now
Defining Population NMEC; Aggregate Population Eligibility	Net-to-Gross for NMEC	Meter Data Access, Click-Through
Process, Review, Roles, and Evaluation	Measure-level Analysis, Lifecycle Savings, Effective Useful Life	Sampling and Extrapolating Savings
Modeling: Baseline, Normalization, Comparison Groups, Exogenous Factors, Non-Routine Events, and Outlier Sites		Postponed Issues (see Table 3)

Terms and Definitions

To establish a common dialogue, PG&E defined a number of terms and definitions to bring consistency to the working group’s conversations. Definitions in the table below have been updated to reflect working group conversation. Of the terms below, only “non-routine event” is currently included in the Rulebook. Table 5 includes additional terms and definitions that Commission staff should consider incorporating into the Rulebook. Additionally, for terms and definitions currently in the Rulebook for use in site-level NMEC programs, Commission staff should consider whether additional detail or clarification is required when applying terms and definitions to population-level NMEC programs.

Table 5. NMEC Terms and Definitions

Term	Definition
Normalization factor	<p>“Normalize” is to adjust energy consumption during different time periods to a common set of operating conditions, in order to facilitate comparison.⁹</p> <p>“Normalization factor” is an independent variable in an NMEC statistical model, also known as a routine event. An example is weather.</p>
Non-Routine Event (defined in the Rulebook)	Externally driven, significant change affecting energy use in the baseline or reporting period and, therefore, must be accounted for in savings estimations.
Exogenous change	Externally-driven (i.e., unrelated to the energy efficiency intervention) change or trend that affects energy usage across all customers or all customers within a segment—both those who participate in an energy efficiency program and those who do not. Examples include economic trends and codes and standards changes. Over one to two years, the impact of this change on NMEC savings calculations may be material or negligible. Use of an appropriate comparison group is one approach that may mitigate its impact on savings calculations.
Comparison vs. Control Group	<p>A comparison group is constructed after participants have been enrolled in a program.</p> <p>A control group is the group identified through randomization in an experimental design that does not experience a program intervention.</p>
“Outlier” Site	A site with an atypical response, compared to most program participants; threshold and factors to be determined. Note: the original definition read “atypical savings.” It was suggested not to limit the definition to atypical <i>savings</i> since sites with energy waste or high savings potential may seem atypical, but the savings are valid. There may also be issues with the energy consumption profile and modeling that make a site atypical.
Fractional Savings Uncertainty (FSU)	Uncertainty of a savings estimate expressed as a fraction of total savings at a particular confidence level. For example, a savings estimate of 10 MW with a 90% confidence interval of 6 to 14 MW (+/- 4) would have fractional savings uncertainty of 40% at 90% confidence level. ASHRAE Guideline 14 provides a formula for calculating fractional savings uncertainty that has been used in site-level NMEC.

⁹ The Rulebook defines a related term, normalized energy savings, as the reduction in energy consumption or demand that occurs in the reporting period, relative to the baseline period, after both have been adjusted (or normalized) to a common set of normal operating conditions. For example, in an NMEC approach in which weather is the only independent variable, normalized energy savings would be calculated by normalizing baseline and reporting period energy consumption to typical year weather and taking the difference.

Areas of Recommendation

Between identifying priority discussion topics on May 15 and the in-person working meeting on June 4, working group participants collaboratively developed straw proposals on the three priority topics (i.e., defining population-level NMEC; process, review, roles, and evaluation; and modeling). The focus of recommendations was to develop guidance critical for 2020 programs.

On June 4, the CPUC hosted an in-person working group meeting to review and refine straw proposals. Meeting attendees broke into small groups to discuss whether the straw proposals contain adequate guidance to advance population-level NMEC programs in 2020, and recommend additional guidance where possible.

Defining Population NMEC and Aggregate Population Eligibility

Topic #1: Definition of Population NMEC

Original Straw-language: *Population NMEC is an energy savings calculation approach in which results are based on energy usage data observed at the meter, and aggregated across a portfolio/program/population rather than a modeled engineering forecast or deemed value.*

Characteristics of Population NMEC Programs Include:

- *For a Population NMEC program, M&V may aggregate savings estimates from a group of sites, where savings from all sites are calculated using the same modeling and analysis methods; or use a pooled approach with a single model to estimate average savings across the population.*
- *Using a consistent modeling approach to measure savings across all sites within a specific program means that the same data collection, data processing, and analytical methods are applied to all participating sites used to obtain the aggregate result for a specific program.*
- *Data from all participating sites are collected and prepared for analysis the same way; the same data are collected from all sites; and data are treated consistently during data cleaning (i.e., the same rules are used to determine outliers or fill data gaps). Values of individual variables may (and are expected to) differ across sites.*
- *Population NMEC programs are those in which savings are claimed for an aggregate or portfolio of sites with similar characteristics.*

Discussion/Outcome: Participants were generally in agreement with the definition and related characteristics of population NMEC programs. There was some discussion of the possibility to change “population NMEC” to “aggregated NMEC” but no decision was made.

Topic #2: Population/Aggregation Eligibility

Original Straw language: *To use a population NMEC approach, the number of sites should be sufficient to have fraction savings uncertainty no more than +/- 50% at a 90% confidence level.*

Discussion/Outcome: Participants generally supported the use of fractional savings uncertainty (FSU) as a metric, although it was noted that:

- The ASHRAE FSU formula cannot be used with hourly data due to autocorrelation, so usage data at a daily or lower time resolution should be used in the calculation.
- FSU will need to be forecast before implementers launch their programs, so implementers will need reasonable ways to estimate the number of sites, projected savings per site, and projected baseline model error per site.

Some participants thought that a 50% FSU, as defined by ASHRAE Guideline 14, was too broad and, therefore, insufficient for use in forecasting and ratepayer risk management. Options to mitigate this issue were to (1) prescribe a different, lower FSU threshold; (2) avoid setting a threshold at this time and have the CPUC evaluate specific proposals; or (3) define “population” by a minimum number of sites.

Revised recommendations:

1. To use a population NMEC approach, the forecasted number of sites, projected savings, and projected baseline model error for individual sites should be sufficient that fractional savings uncertainty (FSU) for the group of sites as a whole is not predicted to exceed 25% at a 90% confidence level, otherwise the implementer and program administrator should seek an exception from the CPUC.¹⁰ Commission staff, in collaboration with stakeholders, should re-evaluate the 25/90 FSU/confidence threshold after NMEC programs have been implemented and operational for one year.
2. The Rulebook should specify that this eligibility threshold applies only to population-level NMEC at the whole-group level, and not site-level NMEC or individual sites within a population-level NMEC group.
3. Implementers, program administrators, and evaluators should use only daily or monthly, and not hourly, data when estimating FSU using guidance in ASHRAE Guideline 14. They may estimate FSU for hourly data using other methods that account for autocorrelation and other issues specific to hourly data.

¹⁰ Commission staff will need to direct implementers and program administrators to the formula to be used in calculating FSU and/or develop more detailed guidelines about FSU calculations. Some working group participants pointed out that the FSU formula in ASHRAE Guideline 14, which was originally developed for models using monthly data, may underestimate the uncertainty of models that use hourly energy usage data.

4. Commission staff should conduct, or delegate to program administrators to conduct, a study on the reasonableness of this threshold and alternate eligibility options.
5. Commission staff should allow implementers and/or program administrators to propose programs with a higher FSU and/or lower confidence level, which would be subject to additional review by Commission staff. If such a program is proposed, implementers and/or program administrators would need to demonstrate how the threshold addresses risks to realizing savings.

Modeling and Methodology

Topic #1: Model/Methodology Transparency and Access

Original Straw language: *Any methodology including calculations should be available for verification, replicability, and evaluation.*

Discussion/Outcome: Participants recommended that, in addition to public or open-source, methodology needs to be “well-documented and reproducible.” This covers raw data, cleaned data, the method to process raw data to cleaned data, documentation thereof, underlying code to calculate savings, step-by-step documentation thereof, related assumptions or calculation engines, and savings calculation results. All methods and supporting documentation should be available to all counter-parties within a program (implementer, program administrator, CPUC, and evaluators). All documentation would be sufficiently detailed to allow another M&V practitioner to reproduce it.

Revised Recommendation: Any methodology, including calculations used, should be available for verification, replication, and evaluation. At a minimum, a methodology available for the aforementioned testing and verification activities. The methodology should have demonstrated performance based on a generally accepted testing and/or validation methodology.

Topic #2: Measurement and Verification (M&V) Plan and Template

Original straw-language: *Use a basic template to ensure every M&V plan that is submitted with the Implementation Plan includes certain aspects, leveraging the site-level NMEC rulebook as general guidance for what to include.*

Discussion/Outcome: Participants were unsure about the need for an M&V plan template because the level of detail needed in an adequate M&V plan makes it difficult to create a template. However, some participants pointed out that if M&V plans followed a standard format and addressed standard topics, they would be easier for reviewers to evaluate.

Additionally, participants were not sure it made sense to use the site-level Rulebook as a guide because some topics that site- and population-level M&V plans need to address may differ. Participants recommended that, in the M&V plan, program administrators and/or implementers should describe how raw data will be processed into a result. The M&V plan should also discuss why the program is appropriate for population-level NMEC, and why the

calculation methodology and variables used for normalization are appropriate for the program and type of sites treated.

Contents of an M&V plan were discussed under M&V Thresholds for Population-Level NMEC Programs.

Topic #3: M&V Thresholds for Population-level NMEC Programs:

Original straw-language: *(In the M&V Plan) Require consideration of certain specifications, do not establish threshold requirements.*

Discussion/Outcome: Criteria to consider in an M&V plan include:

- Normalizing for Weather and other Factors: How does the program normalize for weather? Does the program also normalize for other factors? If so, how?
- Comparison Groups and Baseline: Does the program utilize a comparison group? If so, for what purposes? How is the comparison group composed? How will comparison group data be collected?
- Outlier Site Identification and Treatment: Under what condition(s) will a site be excluded from a population-based program after enrollment, and who should get to decide? Describe any impacts of outlier determination and treatment on savings determinations and/or implementer compensation.
- Non-Routine Events Identification and Treatment: How does the program account for NREs and adjustments (if at all), what are the magnitudes of adjustments, and what types of change(s) to building use or other factors will qualify for allowing a non-routine adjustment to be made? What type of documentation and verification will be required for a non-routine adjustment, what criteria will be used to determine whether the adjustment or treatment it is sufficient?

In addition to these criteria, the small group proposed that the M&V plan should focus discussion on program risks and how the M&V approach, modeling, and other activities, addresses those risks. For instance, the M&V plan should discuss whether and why payable savings could differ from claimable savings (e.g., due to participant disqualification or outlier sites; net versus gross savings) and how that risk would be addressed via program activities or program design (e.g., site exclusion/outlier site protocol established up-front, rules on eligibility, use of a comparison group or other basis for adjustments). Additionally, M&V plans may address risks related to effective useful life estimates and the potential impact to forecasted lifetime savings.

Process, Roles, Review, and Evaluation

Topic #1: Establish Terms and Definitions for Savings Terms

Overall, the discussion among participants focused on program administrators' need for clarity on how to report and claim savings for population-NMEC programs. Note that these definitions were discussed primarily to clarify terms among working group members and facilitate consistent use and understanding in conversation. While they are not necessarily recommendations for Commission adoption, the definitions could help inform ex ante and reporting practices for population NMEC programs. The small group discussed the following refinements to straw proposal definitions:

- Ex Ante Forecast Savings: Submitted by the implementer or the program administrator to the regulator for planning purposes prior to program launch. In order to forecast effective useful life (EUL) and demonstrate how the program would achieve projected impacts, forecasted savings may include measure-level savings values and installation rates. Forecasted savings should be a best estimate that could be based on sources including DEER values, engineering estimates, information from prior program years, etc.
- Ex Ante Reported and Claimed Savings¹¹: After program launch, program administrators report savings to the CPUC prior to formal evaluation, measurement, and verification (EM&V). Program-level savings should be reported in program administrators' Quarterly and Annual Reports.
 - NMEC savings claims are expected to be based on at least 12 months of post-installation usage data. However, in the year in which installation is completed but before one year of post-installation data are available, options for CPUC to consider for reported savings include:
 - Using the forecasted values identified for planning purposes, possibly discounted based on the predicted FSU;
 - Updating forecasted values by extrapolating interim NMEC results (e.g., based on number of installations to date) and expenditures;
 - Holding NMEC savings (and potentially costs) until one full year of post-installation data are available - note that current reporting requirements prescribe that program administrator costs are reported in the year they are incurred. If a savings claim is held while program money is spent and reported, program administrators' cost-effectiveness would be inaccurate.

¹¹ As of June 2019, the statewide Reporting Project Coordination Group, a forum for CPUC staff and program administrators, has also undertaken discussions of how NMEC savings should be reported.

- The CPUC may wish to set interim guidelines for claiming NMEC savings until a long-term process is identified. This is an area for further guidance from CPUC to ensure that the reporting/claims process does not dis-incentivize program administrators from using NMEC methods to claim savings.
- Payable Savings: Determined via the approved M&V and Implementation Plan (negotiated between the PA and implementer, approved by CPUC), constitutes the basis of payments between the program administrator and implementer. Ideally, based at least in part on meter-based savings (in real time or trued up)
 - May or may not be the same as claimable, but encouraged to be similar.
- Ex Post (Evaluated) Savings: Determined by the CPUC in separate third-party evaluation process.

The small group did not discuss specific edits to the definition of “Payable Savings” but did discuss cases where payable might differ from claimable savings. For instance, claimable savings may differ if sites within a population are disqualified (e.g., due to non-routine events) or if claimed savings are only net savings. Additionally, Commission staff emphasized that, in the third party program context, “payable savings” refers to payments from program administrators to third party implementers and not customer incentives. Further, stakeholders clarified that the current Implementation Plan process does not require the CPUC to approve M&V plans.

There was no discussion or objection to the definition of Ex Post (Evaluated) Savings.

Topic #2: Data

Original Straw-language: *Move towards common data sets being used across different savings determinations.*

Discussion/Outcome: There was broad agreement that stakeholders should move towards the use of common data sets for program management, savings claims, and CPUC-led ex post evaluation (and, where possible, forecasting). Program administrators should maintain and manage the data on each of their programs (including usage and other data). Data should flow from the implementer forward through the program chain to the evaluator (as opposed to relying on the evaluator’s data).

Topic #3: Pay-for-Performance

Original Straw-language: *Encourage, but do not require Pay-for-Performance.*

Discussion/Outcome: There was agreement that the CPUC should encourage pay-for-performance program design, an arrangement in which program administrators compensate implementers based on NMEC energy savings; however, there was no consensus on whether the CPUC should prescribe that a minimum proportion (threshold not discussed) of

implementer compensation must be pay-for-performance. Commission staff clarified that, in the third party program context, “pay-for-performance” refers to paying third party implementers based on actual energy savings and does not refer to customer incentives or other program design issues.

Meeting participants clarified that the broader issue related to this recommendation is to minimize program risk and that increasing pay-for-performance program designs would decrease risk to ratepayers. Overall, implementers and program administrators should be considering which parties are subject to risks of overspending for savings or underperformance of realized savings and how those risks could be minimized.

Areas for Further Discussion

Stakeholders identified measure-level analysis (which includes lifecycle savings and effective useful life) and net-to-gross values for NMEC programs as issues that may warrant further discussion in the next round of working group meetings. These items were not discussed in detail during the course of initial working group activities (i.e., May to June 2019). Until additional guidance is developed, interim guidance was identified based on existing documentation from custom projects, high opportunity projects and programs (HOPPs), and pay-for-performance pilots.

Measure-Level Analysis, Lifecycle Savings, and Effective Useful Life

Interim Guidance: Past HOPPs and current pay-for-performance solicitations allow a weighted-average effective useful life approach for estimated savings for NMEC proposals. In practice, this means that first year savings are measured at the meter and lifecycle savings are calculated as the product of first year savings and weighted average EUL.

Additional questions remain about when and how persistent savings might be claimed beyond metered M&V.

Net-to-Gross Values for NMEC programs

Interim Guidance: Commission staff-approved default net-to-gross values for NMEC programs are:

- Non-residential programs: 0.90
- Single-family residential: 0.85
- Multi-family residential: 0.55

Arguments and/or methodologies to propose any alternative net-to-gross must be fully detailed in the M&V plan, and are subject to program administrator and CPUC review.

Topics Raised and Deferred

Additional topics raised and postponed or determined not to be applicable to this working group include:

- Meter Data Access, Click-Through applications for NMEC
- Role of Sampling in NMEC
- Claiming impacts beyond energy savings with NMEC (e.g., DR or other load-shaping interventions)
- Addressing challenges of estimating energy efficiency program savings when distributed generation, storage, or electric vehicles are present Additional Pay for Performance design considerations

Table 3 contains some additional detail regarding Meter Data Access and the Role of Sampling. Commission staff should work with stakeholders to determine the relative priority level of these issues and determine next steps.

Summary of Recommendations for CPUC inclusion in Rulebook

Table 6 summarizes the working group's recommendations for consideration in updates to the Rulebook.

Table 6. Working Group Recommendations

Topic	Recommendation
Definition of Population NMEC	<p>Population NMEC is an energy savings calculation approach in which results are based on energy usage data observed at the meter, and aggregated across a portfolio/program/population rather than a modeled engineering forecast or deemed value.</p> <p>Characteristics of Population NMEC Programs include:</p> <ul style="list-style-type: none"> • For a Population NMEC program, M&V may aggregate savings estimates from a group of sites where savings from all sites are calculated using the same modeling and analysis methods; or used a pooled approach with a single model to estimate average savings across the population. • Using a consistent modeling approach to measure savings across all sites within a specific program means that the same data collection, data processing, and analytical methods are applied to all participating sites used to obtain the aggregate result for a specific program. • Data from all participating sites are collected and prepared for analysis the same way; the same data are collected from all sites; and data are treated consistently during data cleaning (i.e., same rules are used to determine outliers or fill data gaps). Values of individual variables may differ across sites.

	<ul style="list-style-type: none"> Population NMEC programs are those in which savings are claimed for an aggregate or portfolio of sites with similar characteristics.
Aggregate Population Eligibility	<p>Working group recommendations include:</p> <ol style="list-style-type: none"> To use a population NMEC approach, the forecasted number of sites, projected savings, and projected baseline model error for individual sites should be sufficient that fractional savings uncertainty (FSU) for the group of sites as a whole is not predicted to exceed 25% at a 90% confidence level, otherwise the implementer and program administrator should seek an exception from the CPUC.¹² Commission staff, in collaboration with stakeholders, should re-evaluate the 25/90 FSU/confidence threshold after NMEC programs have been implemented and operational for one year. The Rulebook should specify that this eligibility threshold applies only to population-level NMEC at the whole-group level, and not site-level NMEC or individual sites within a population-level NMEC group. Implementers, program administrators, and evaluators should use only daily or monthly, and not hourly, data when estimating FSU using guidance in ASHRAE Guideline 14. They may estimate FSU for hourly data using other methods that account for autocorrelation and other issues specific to hourly data. Commission staff should conduct, or delegate to program administrators to conduct, a study on the reasonableness of this threshold and alternate eligibility options. Commission staff should allow implementers and/or program administrators to propose programs with a higher FSU and/or lower confidence level, which would be subject to additional review by Commission staff. If such a program is proposed, implementers and/or program administrators would need to demonstrate how the threshold addresses risks to realizing savings.
Model/Methodology Transparency and Access	Any methodology, including calculations used, should be available for verification, replication, and evaluation. At a minimum, a methodology must be available for the aforementioned testing and verification activities. The methodology should have demonstrated performance based on a generally accepted testing and/or validation methodology.
M&V Plan and Template	The working group did not recommend an M&V template at this time. However, in the M&V plan, program administrators and/or implementers should describe how raw data will be processed into a result. The M&V plan should also discuss why the program is appropriate for population-level NMEC, and why the calculation methodology and

¹² Commission staff will need to direct implementers and program administrators to the formula to be used in calculating FSU and/or develop more detailed guidelines about FSU calculations. Some working group participants pointed out that the FSU formula in ASHRAE Guideline 14, which was originally developed for models using monthly data, may underestimate the uncertainty of models that use hourly energy usage data.

	variables used for normalization are appropriate for the program and type of sites treated.
M&V Thresholds for Population-level NMEC Programs	<p>Criteria to consider in an M&V plan include:</p> <ul style="list-style-type: none"> • <u>Normalizing for Weather and other Factors</u>: How does the program normalize for weather? Does the program also normalize for other factors? If so, how? • <u>Comparison Groups and Baseline</u>: Does the program utilize a comparison group? If so, for what purposes? How is the comparison group composed? How will comparison group data be collected? • <u>Outlier Site Identification and Treatment</u>: Under what condition(s) will a site be excluded from a population-based program after enrollment, and who should get to decide? Describe any impacts of outlier identification and treatment on savings determinations and/or implementer compensation. • <u>Non-Routine Events Identification and Treatment</u>: How does the program account for NREs and adjustments (if at all), what are the magnitudes of adjustments, and what types of change(s) to building use or other factors will qualify for allowing a non-routine adjustment to be made? What type of documentation and verification will be required for a non-routine adjustment, what criteria will be used to determine whether the adjustment or treatment it is sufficient? • <u>Program Risks and Risk Management</u>: What are the potential risks to this population NMEC approach? How do the M&V approach, modeling, and other program activities address risks of not realizing savings or overpaying for savings? Do payable savings differ from claimable savings? If so, why is this appropriate and how do program activities or program design (e.g., site exclusion/outlier site protocol established up-front, rules on eligibility, use of a comparison group or other basis for adjustments) address risk?
Forecasting, Reporting, and Claiming Savings	<p><u>Forecasting Savings</u>: Prior to program launch, program administrators must forecast program savings for planning and cost-effectiveness purposes. In order to forecast Effective Useful Life (EUL) and demonstrate how the program would achieve projected impacts, forecasted savings may include measure-level savings values and installation rates. Forecasted savings should be a best estimate that could be based on sources including DEER values, engineering estimates, information from prior program years, and/or other transparent sources as they become available.</p> <p><u>Reporting and Claiming Savings</u>¹³: After program launch, program administrators report savings to the CPUC prior to formal evaluation, measurement, and verification (EM&V). Program-level savings should be reported in program administrators' Quarterly and Annual Reports.</p>

¹³ As of June 2019, the statewide Reporting Project Coordination Group (PCG), a forum for CPUC staff and program administrators, has also undertaken discussions of how NMEC savings should be reported.

	<p>NMEC savings claims are expected to be based on at least 12 months of post-installation usage data. However, in the year in which installation is completed, but before one year of post-installation data are available, options for CPUC to consider for reported savings include:</p> <ul style="list-style-type: none"> • Using the forecasted values identified for planning purposes, possibly discounted based on the predicted FSU; • Updating forecasted values by extrapolating interim NMEC results (e.g., based on number of installations to date) and expenditures; • Holding NMEC savings (and potentially costs) until one full year of post-installation data are available - note that current reporting requirements prescribe that program administrator costs are reported in the year they are incurred. If a savings claim is held while program money is spent and reported, program administrators' cost-effectiveness would be inaccurate. <p>The CPUC may wish to set interim guidelines for claiming NMEC savings until a long-term process is identified.</p>
Data	<p>Stakeholders should move towards the use of common data sets for program management, savings claims, and CPUC-led ex post evaluation (and where possible, forecasting). Program administrators should maintain and manage the data on each of their programs (including usage and other data). Data should flow from the implementer forward through the program chain to the evaluator (as opposed to relying on the evaluator's data).</p>
Pay-for-Performance	<p>The CPUC should encourage pay for performance, an arrangement in which program administrators compensate implementers based on NMEC energy savings. However, there is no recommendation at this time on whether the CPUC should prescribe that a minimum proportion of implementer compensation must be pay-for-performance. The broader issue related to this recommendation is to minimize program risk and that increasing pay-for-performance program designs would decrease risk to ratepayers. Overall, implementers and program administrators should be considering which parties are subject to risks of overspending for savings or underperformance of realized savings and how those risks could be minimized.</p>

Next Steps

Commission staff will consider the working group's recommendations in their development of guidance on population-level NMEC programs. Guidance will be incorporated into the CPUC's Rulebook and an updated Rulebook will be issued for formal comment in proceeding A.17-01-013 *et al.* All parties to the proceeding have the opportunity to comment on the updated Rulebook prior to finalizing guidance.

As prescribed in the January Ruling, Commission staff is directed to lead a working group to "develop further rules and guidance for programs leveraging NMEC methods," which can include site-level and/or population-level NMEC issues. Commission staff should work with stakeholders to determine whether measure-level analysis, lifecycle savings, effective useful life, net-to-gross values, and/or other topics raised but deferred are priority issues to address to inform near-term program designs. Stakeholders should refer to Commission staff with questions on timing of future working group activities.

Commission staff should also develop a schedule of future working group meetings, for the following purposes:

- Commission staff should consider a regular cadence on which to reconvene the working group to discuss lessons learned and review rules for population and site-level NMEC.
- At a minimum, approximately one year from the approval of the revised Rulebook, the working group should reconvene to review the rules, particularly around Fractional Savings Uncertainty thresholds; discuss lessons learned; and propose any related updates.
- Stakeholders expressed interest in the Commission convening a similar process to review the rules for site-level NMEC.

Appendix A: Meeting Notes

NMEC Working Group: Meeting #1 Notes

NMEC Working Group: Meeting #1

Monday, May 6, 2019 from 10:00-11:00am via WebEx

Hosted by: Pacific Gas & Electric on behalf of the CA Public Utilities Commission

Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

These notes are broken into two sections:

- 1) a narrative Meeting Summary, providing an overview of topics discussed, and
- 2) a set of Recorded Comments and Discussion, capturing the more detailed comments provided by stakeholders both verbally and in the chat box. Comments sent privately to the facilitator are included below unless specifically addressed to the facilitator.

For questions about this meeting, the Working Group process, or how to get involved, please contact Michelle Vigen, Common Spark Consulting at michelle@common-spark.com.

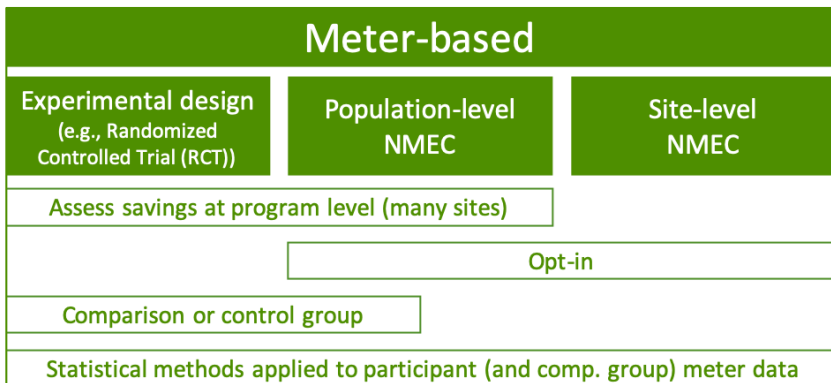
Meeting Summary

This webinar served as an introductory meeting for the Normalized Metered Energy Consumption (NMEC) Working Group process. The objectives of this meeting were to provide a brief background on NMEC policy thus far; the January 31, 2019 ruling prompting this Working Group process; propose a definition and scope for population-level NMEC; and provide steps for stakeholders to engage in the Working Group process. A survey link was, and will be provided, for interested individuals to receive Working Group updates.

NMEC Background

Caroline Massad Francis from PG&E provided a short description of NMEC and the scope of the Work Group's focus on population-based NMEC, how it is generally distinct from other types of NMEC.

Population-level NMEC lies between experimental design and site-level normalized metered energy consumption, and may or may not include a comparison group. California has been developing NMEC policy for some time, formally with AB 802, the launch of High Opportunity Programs and Projects (HOPPs), and two Rulings by the CPUC on M&V Guidelines related to NMEC.



About the NMEC Working Group

Coby Rudolph from the CPUC Energy Division provided a background on the NMEC Work Group, including its relevance in the context of cost-effective energy efficiency portfolios, the goal to double energy efficiency by 2030, clean energy standards (e.g. SB 100), and aggressive efforts toward decarbonization. He noted that while guidance has been provided for site-level NMEC, especially with third-party programs rolling out over the next year, it is important to the CPUC to also provide some level of guidance for population-level NMEC. He summarized the January 31, 2019, which directs CPUC staff to update site-level NMEC rules, distinguish between site-level and population-level NMEC, and via a Working Group process develop rules for population-level NMEC.

Working Group Objectives

Michelle Vigen Ralston (Common Spark Consulting) serving as facilitator, outlined the goals of the Working Group. The Normalized Metered Energy Consumption (NMEC) Working Group is a concentrated effort in May/June 2019 focusing on key guidance for population-level NMEC - e.g., defining population-level NMEC, identifying topics where guidance is needed and feasible to establish in the next few weeks, developing consensus recommendations for the Rulebook. While the NMEC Working Group scope can extend beyond the topic of population-level NMEC, the focus until mid-June will be on population-level NMEC guidance.

Working Group feedback will lead to a report with recommendations for the NMEC Rulebook updates; stakeholders will also be able to provide formal feedback on Rulebook updates via the proceeding.

Future Meeting Dates

Future meeting for the Working Group are as follows:

- May 15 (time TBD) - webinar to discuss “population-level NMEC” definitions and confirm working group topics
- June 4 – half-day in-person meeting at CPUC to review straw proposals on topics and discuss consensus recommendations
- Mid-June - webinar to share finalized proposals and consensus recommendations

Interested stakeholders were invited to complete a survey to be added to the list of Working Group members (http://bit.ly/NMEC_WG_Survey) and to ensure they receive the most up-to-date information about the Working Group meetings.

Discussion: What is Population-Level NMEC?

Attendees were presented with a proposed definition of population-level NMEC, specifically, what are the factors that distinguish population-level NMEC from other types of NMEC. The facilitator presented the following:

Proposal: concepts that distinguish population-level NMEC

- Claim savings at the cohort level (i.e., group of sites)
- Consistent method to measure savings at all sites
 - Could be pooled method or aggregate site-level estimates
- Factors that drive energy consumption are consistent across all sites

- Data from all sites are collected and prepared for analysis the same way

When asked what stakeholders thought of this set of factors, stakeholders generally thought it was a good place to start.

Two points in the above proposed definition that were raised were:

1. When identifying a group of buildings where the “factors that drive energy consumption are consistent across all sites,” there is not clarity on what the threshold is for “consistent.” A definition, including perhaps statistical validity boundaries, may be needed to make this clearer.
2. When aggregating site-level estimates, how is this distinct from simply adding up a group site-level NMEC projects? How does the site-level estimation perhaps differ from full site-level NMEC (which by current rules is considered “custom”)?

Other Topics and Questions Identified in Discussion

Discussion opened up on a number of related issues and topics, naturally prompted by this definition, that have been captured and included below, and will be organized for further discussion in subsequent meetings. They are summarized here, in no particular order:

- Non-Routine Adjustments within a Population: How to handle non-routine event adjustments within a population, if at all.
 - Some stakeholders (PG&E, OpenEE, Public Advocates Office) commented that non-routine events and other outliers (e.g., energy consumption increase) in a population “cancel out.” Others disagreed.
 - Causation may be a sub-issue within this category. Energy consumption within a population could increase at an individual site (e.g., due to production increase or fuel switching) that may be unrelated to the EE intervention. How should these sites be handled within a population?
- Aggregation Methodology: What is the appropriate aggregation method to roll individual sites into a “population”?
- Population Eligibility: How is “population” defined or measured? For instance, is a sample of individual sites appropriate? Is there a threshold level of statistical power required?
 - There may be a justifiable reason to define “population” differently when paying for savings vs. claiming net savings. This impacts the aggregator/implementer business model.
- DER Interactions: How do you handle impacts by other distributed energy resources (DERs)? How should methods anticipate and handle increases in solar PV, demand response program participation, and/or electric vehicle adoption within a population?
- Baseline Modeling: What are the necessary baseline models?

Next Steps

Participants and other stakeholders are invited to complete a survey to identify their interest in participating in the Working Group process and to help the facilitation team identify a global set of questions, issues, and areas of guidance. The facilitator intends to work with interested stakeholders between Working Group calls to develop written proposals around the highest priority and most well-understood and accepted guidance.

The survey link and webinar materials will be shared by CPUC as follow up to this meeting.

The next meeting will be May 15 via webinar, time TBD.

NMEC Working Group: Meeting #2 Notes

NMEC Working Group: Meeting #2

Wednesday, May 15, 2019 from 1:30-3:00pm via WebEx

Hosted by: Pacific Gas & Electric on behalf of the CA Public Utilities Commission

Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

These notes are broken into two sections:

- 1) a narrative Meeting Summary, providing an overview of topics discussed, and
- 2) a set of Recorded Comments and Discussion, capturing the more detailed comments provided by stakeholders both verbally and in the chat box.

For questions about this meeting, the Working Group process, or how to get involved, please contact Michelle Vigen, Common Spark Consulting at michelle@common-spark.com.

Meeting Summary

This webinar served as a working and organizing meeting for the Normalized Metered Energy Consumption (NMEC) Working Group process. The objectives of this meeting were to report back to stakeholders findings from the feedback survey and Meeting #1 conversation and comments regarding the issues they are most interested in and the issues they think are most critical to resolve in the near-term regarding population NMEC. The meeting would organize topics accordingly and identify volunteers to continue discussions in small groups, including drafting straw proposals/recommendations to bring back to the whole group at the June 4, 2019 in-person meeting. The survey link was, and will be provided, for interested individuals to receive Working Group updates and continue to provide feedback.

Meeting 1 Recap

Michelle Vigen Ralston from Common Spark Consulting provided a summary of Meeting 1 and the results that came in from the survey and other comments. She described how all the comments were looked at, questions combined, and frequency of topics raised indicated. The issue areas with the greatest number of questions and interest were combined into proposed buckets, to be presented in this meeting for feedback and revision.

As next steps, small group volunteers will be called upon to take up the topics and proposed questions, to develop straw proposals to be presented at the June 4 meeting.

Terms and Definitions

To support clear communication and dialogue during these Working Group meetings, Caroline Massad Francis from PG&E presented a short list of broad terms and definitions (normalization factor, non-

routine event, exogenous, comparison vs. control group, and outlier site) to ensure stakeholders are understanding and using them consistently. Stakeholder feedback included:

- Outlier Site: It was suggested that we don't limit the definition to atypical *savings* since sites with energy waste or high savings potential may seem atypical but the savings are valid. There may also be issues with the *energy consumption profile and modeling* that make a site atypical as well.
- Savings: Define "gross savings" and "net savings" in the context of NMEC; gross savings is based on the measurement type (existing conditions or deemed baseline), net savings are often the difference of difference in a control group in the RCT/experimental design context. But what about for population NMEC?
- Comparison Group: Need to clarify how, if comparison groups are constructed after participants are in the program, what determines if some participants are or are not in the comparison group.
- Exogenous: Draw from statistical definition and include how it is applied to population NMEC.
- General Suggestion: Include examples for "normalization factor," "non-routine event," and "exogenous"
- *Additional comments included in the detailed notes below.*

Defining "Population NMEC": Follow-up and Consensus Check

Ralston reported that there were still no significant issues raised with the proposed definition, but that the use of the term "consistent" left open questions about what that means. Such issues will be taken up in the small groups. Those areas notwithstanding, Ralston double-checked with the group if this definition, set of distinguishing features, works. Stakeholder feedback included:

- The meat of the issue is still what constitutes a population, when has that threshold been reached.
- Instead of measuring savings at the cohort level, it may be clearer to say at the program or program cohort level. A major driver behind population NMEC is the ability to measure savings at the higher program level.

Generally, stakeholders were comfortable moving on from the definition, knowing some specific questions would be taken up by a subgroup moving forward.

Proposed Issue Buckets, Feedback

Ralston presented an overview of buckets, including Priority (green), Next-Round (orange), and Other (gray).

<u>Defining Population NMEC</u>	<u>Aggregate population eligibility</u>	<u>Comparison groups</u>	<u>Exogenous factors, NREs, Outlier sites</u>
<u>Net-to-Gross for NMEC</u>	<u>Measure-Level Analysis, Lifecycle Savings, EUL</u>	<u>Modeling, Baseline, Normalization</u>	<u>Process, Review, and Roles</u>

Metered Data Access, Click-Through**Sampling and Extrapolating Savings****Postponed Issues**

The group asked about the use case of the Working Group recommendations and rulebook, and confirmed it was meant to guide program filings and ex ante estimates, in particular. Ex post evaluation still remains a separate activity under separate guidelines. Stakeholders noted their further interest in how NMEC program design and ex post EM&V would become more integrated, making ex post faster and more cost-effective, and putting more responsibility on the upfront M&V planning to account for evaluation needs. Further, stakeholders sought clarity on how to structure third party implementers contracts and how implementers should structure incentive payments in relation to verifiable savings.

Resulting Issue Buckets

Issues of process (e.g., program filing, M&V, ex ante, and ex post, including claimable vs. payable savings) were prioritized for discussion over the next two weeks.

As Ralston gathered volunteer names for the different Buckets, stakeholders also added questions regarding baseline and modeling, but could not determine if that aligned best with the Comparison Group bucket or the Exogenous/NRE/Outlier Sites bucket. Ralston, for the sake of time, offered to look back through the conversation and volunteers and explore combining all three under a single and large-scaled Modeling bucket.

The resulting Priority (green) and Next-Round (orange) buckets are as follow:

Defining Population NMEC; Aggregate Population Eligibility**Modeling: Baseline, Normalization, Comprison Groups, Exogenous Factors, NREs, and Outlier Sites****Process, Review, Roles, and Evaluation****Net-to-Gross for NMEC****Measure-Level Analysis, Lifecycle Savings, EUL**

Stakeholders signed up for small groups under these buckets to help draft proposals. Also, stakeholders that indicated interest in a particular topic via the survey or other comments will also be included in initial small group communications and invited to participate and contribute.

Future Meeting Dates

Future meeting for the Working Group are as follows:

- June 4 from 1:00-5:00pm in-person meeting at CPUC to review straw proposals on topics and discuss consensus recommendations

- June 12, time TBD, webinar to share finalized proposals and consensus recommendations

Interested stakeholders were invited to complete a survey to be added to the list of Working Group members (http://bit.ly/NMEC_WG_Survey) and to ensure they receive the most up-to-date information about the Working Group meetings. Questions can be sent to Michelle Vigen Ralston at michelle@common-spark.com.

Next Steps

Ralston will work with interested stakeholders between Meeting 2 and Meeting 3 to develop written proposals around the highest priority and most well-understood and accepted guidance.

The survey link and webinar materials will be shared by CPUC as follow up to this meeting.

The next meeting will be June 4 from 1:00-5:00pm at CPUC. Room TBA.

NMEC Working Group: Meeting #3 Notes

NMEC Working Group: Meeting #3

Tuesday, June 4, 2019 from 1:00-5:00pm in the Golden Gate Room at CPUC

Hosted by: CA Public Utilities Commission

Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

These notes are broken into two sections:

- 1) a narrative Meeting Summary, providing an overview of topics discussed, and
- 2) a set of Recorded Comments and Discussion, capturing the more detailed comments provided by stakeholders both verbally and in the chat box.

For questions about this meeting, the Working Group process, or how to get involved, please contact Michelle Vigen, Common Spark Consulting at michelle@common-spark.com.

Meeting Summary

This meeting served as a working meeting to review recommendations discussed to date for the use of normalized metered energy consumption (NMEC) data within a population. Michelle Vigen Ralson from Common Spark Consulting reviewed previous meeting outcomes and meeting participants worked in small groups to confirm and/or refine recommendations, clarify guidance, and identify outstanding issues. Small groups reported back on their discussions and outcomes at the end of the day.

Common Spark Consulting will take the cumulative meeting outcomes and develop a draft report to present to Working Group participants and then finalize to submit to PG&E and Commission staff. Commission staff will consider the report when developing the NMEC ruleset to address population-level NMEC-based programs. Once the ruleset update is drafted, parties will have an opportunity to submit comments on the record before the rules are finalized.

NOTE: The recommendations below capture the discussion among the working group. Proposals were not presented to a vote, and not formally tested for consensus. They are the outcome of several meetings and work spanning several weeks and do reflect the best practices and knowledge base of a diverse stakeholder group inclusive of the program administrators, third party implementers, experts and evaluators and others.

Meetings 1 and 2; Small Group Work Recap

The first and second working group meetings were held on May 6 and May 15. During the meetings, the group discussed priority buckets of issues to address in the short-term, issues to address in the next round, and issues that should be discussed later. The following priority buckets emerged:

1. Defining “Population NMEC” and Aggregate Population Eligibility

2. Modeling: Baseline, Normalization, Comparison Groups, Exogenous Factors, Non-Routine Events, and Outlier Sites
3. Process, Review, Roles, and Evaluation

On May 29 and 30, small groups held calls on the priority bucket issues and collaboratively documented draft recommendations.

June 4 Small Group Sessions

For two sessions (approximately 45 minutes long each), working group attendees broke into small groups organized in the topics above. Before breaking into groups, Common Spark Consulting presented proposed recommendations based on the various proposals that received the most attention and agreement in the Google Docs and conference calls. They represented high-level proposals and draft recommendations that each small group should work to strengthen, clarify, and amend if necessary.

Small Group Sessions – Report Outs

After the small groups met, the working group reconvened to summarize their discussions of the original “straw” recommendations they considered. The text below presents each recommendation proposed to each group by Common Spark Consulting, and the observations made by each small group in its report-out.

Defining Population NMEC and Aggregate Population Eligibility

Topic #1: Definition of Population NMEC

Original Straw-language: *Population NMEC is an energy savings calculation approach in which results are based on energy usage data observed at the meter, and aggregated across a portfolio/program/population rather than a modeled engineering forecast or deemed value.*

Discussion/Outcome:

Participants were generally in agreement with the definition and related characteristics of population NMEC programs (see slide 11). There was some discussion of the possibility to change “population NMEC” to “aggregated NMEC” but no decision was made.

Topic #2: Population/Aggregation Eligibility

Original Straw language: *“To use a Population NMEC approach, the number of sites should be sufficient to have fraction savings uncertainty no more than +/- 50% at a 90% confidence level.”*

Discussion/Outcome:

Participants generally supported the use of fractional savings uncertainty as a metric, although it was noted that:

- The ASHRAE FSU formula cannot be used for hourly data due to autocorrelation, so this should be applied to usage data at a daily or lower time resolution
- FSU will need to be forecast before implementers launch their programs, so implementers will need reasonable ways to estimate the number of sites, projected savings per site, and projected baseline model error per site.

Some participants thought that a 50% fractional savings uncertainty (FSU), as defined by ASHRAE Guideline 14, was too broad and, therefore, insufficient for use in forecasting and ratepayer risk management. Options to mitigate this issue were to (1) prescribe a different, lower FSU threshold; (2) avoid setting a threshold at this time and have the CPUC evaluate specific proposals; or (3) define “population” by a minimum number of sites.

Revised recommendation:

1. *To use a Population NMEC approach, the forecasted number of sites, projected savings, and projected baseline model error should be sufficient to have fractional savings uncertainty (FSU) no more than +/- 25% at a 90% confidence level, otherwise an exception should be sought.*
2. *Re-evaluate the 25/90 FSU after NMEC programs have been implemented and operational for one year*
3. *Specify that this eligibility threshold applies only to population-level NMEC and not site-level NMEC.*
4. *Use only daily or monthly, and not hourly, data when estimating the FSU*
5. *Order the PAs contract conduct an EM&V study on the reasonableness of this threshold and alternate eligibility options.*
6. *Allow implementers and/or program administrators to propose programs with a higher FSU or lower confidence level, which would be subject to additional review by Commission staff. If such a program is proposed, implementers and/or program administrators would need to demonstrate how the threshold addresses risks to realizing savings.*

Modeling and Methodology

Topic #1: Model/Methodology Transparency and Access

Original Straw language: *“Any methodology including calculations should be available for verification, replicability, and evaluation.”*

Discussion/Outcome:

The group presented a revised recommendation, discussed below.

Participants recommended that, in addition to public or open-source, methodology needs to be “well-documented and reproducible.” This covers raw data, cleaned data, the method to process raw data to cleaned data, documentation thereof, underlying code to calculate savings, step-by-step documentation thereof, related assumptions or calculation engines, and savings calculation results. All should be available to all counter-parties within a program (implementer, program administrator, CPUC, and evaluators). All documentation would be sufficiently detailed to allow another M&V practitioner to reproduce it.

Revised Recommendation:

Any methodology including calculations used should be available for verification, replication, and evaluation. Methodology may be public or open-source, or at least available for the aforementioned verification activities. Ideally, the methodology would have demonstrated performance based on a generally accepted testing methodology.

Topic #2: Measurement and Verification (M&V) Plan and Template

Original straw-language: *“Use a basic template to ensure every M&V plan that is submitted with the Implementation Plan includes certain aspects, leveraging the site-level NMEC rulebook as general guidance for what to include.”*

Discussion/Outcome:

Participants were unsure about the need to use of an M&V plan template because the level of detailed needed in an adequate M&V plan makes it difficult to create a template. However, some participants pointed out that if M&V plans followed a standard format and addressed standard topics, they would be easier for reviewers to evaluate.

Additionally, participants were not sure it made sense to use of the site-level Rulebook as a guide because some topics that site- and population-level M&V plans need to address may differ. Participants recommended that program administrators and/or implementers should describe how raw data will be processed into a result. The M&V plan should also discuss why the program is appropriate for population-level NMEC, and why the calculation methodology and variables used for normalization are appropriate for the program and type of sites treated.

Contents of an M&V plan were discussed under Recommendation #3.

Topic #3: Thresholds for Population-level NMEC Programs:

Original straw-language: *“Require consideration of certain specifications, do not establish threshold requirements.”*

Discussion/Outcome:

In addition to the outlined criteria to consider in an M&V plan (see slide 14), the small group proposed that the M&V plan should focus discussion on program risks and how the M&V approach, modeling, and other activities, addresses those risks. For instance, the M&V plan should discuss the whether and why payable savings could differ from claimable savings (e.g., due to participant disqualification or outlier sites; net versus gross savings) and how that risk would be addressed via program activities or program design (e.g., site exclusion protocol established up-front, rules on eligibility, use of a comparison group or other basis for adjustments). Additionally, M&V plans may address risks related to effective useful life estimates and the potential impact to forecasted lifetime savings.

Process and Roles**Topic #1: Establish Terms and Definitions for Savings Terms**

****Note:** This is primarily for internal working group clarity, not necessarily for CPUC adoption.

Overall, the program administrators need clarity on how to report and claim savings for population-NMEC programs. The small group discussed the following refinements to definitions.

- *Ex Ante Forecast Savings: Submitted by the implementer or the program administrator to the regulator for planning purposes prior to program launch. Includes measure-level savings values and installation rates to demonstrate how the program would achieve the projected impacts.*

Best estimate based on DEER values, engineering estimates, information from prior program years, etc.

- *Ex Ante Reported and Claimed Savings - After program launch, savings reported to the CPUC prior to formal evaluation, measurement, and verification (EM&V). Savings would be reported in one line in program administrators' Quarterly Reports.*
 - *In the first year after installation but before one-year of post-installation data are available, potential OPTIONS for CPUC to consider for PA-reported & claimed savings may include various approaches like:*
 - *Quarterly reporting (and annual claim?) based on the forecasted values used for planning purposes - possibly discounted by the FSU; or based on interim NMEC results and expenditures*
 - *Hold NMEC savings (& potentially costs) until one full year of post-installation data are available, on rolling basis - note that current reporting requirements prescribe that program administrator costs are reported in the year they are incurred. If a savings claim is held while program money is spent and reported, program administrators' cost-effectiveness would be inaccurate, and savings achieved vs. PA annual goals would also be distorted.*
 - *Set reporting carve-out for NMEC programs for interim period until long-term process is identified*
 - *After one-year of post-installation data are available, savings claims are based on the NMEC model.*
 - *This is an area for further guidance from CPUC to ensure that the reporting/claims process does not dis-incentivize PAs from using NMEC methods to claim savings.*

The small group did not discuss specific edits to the definition of “Payable Savings” but did discuss cases where payable might differ from claimable savings. There was also clarification from ED staff that, *in the 3P context*, payable savings refers to payments from PAs to 3P implementers (not customer incentives). For instance, claimable savings may differ if sites within a population are disqualified (e.g., due to non-routine events) or if claimed savings are only net savings. Additionally, it was clarified that current process does not require the CPUC to approve M&V plans.

There was no discussion or objection to the definition of Ex Post (Evaluated) Savings (see slide 15).

Topic #2: Data

Original Straw-language: “Move towards common data sets being used across different savings determinations.”

Discussion/Outcome:

There was broad agreement that stakeholders need to move towards the use of common data sets, and that Program Administrators should maintain and manage the data on each of their programs (including usage and other data). Data would flow from the implementer forward through the program chain to the evaluator (as opposed to relying on the evaluator's data).

Topic #3: Pay-for-Performance

Original Straw-language: “Encourage, but do not require Pay for Performance”

Discussion/Outcome:

There was agreement to encourage pay for performance but there was not consensus on whether the CPUC should prescribe that a minimum proportion (threshold not discussed) of programs must be pay for performance (or payment to implementers must be based on energy savings determined at the meter). Meeting participants clarified that the broader issue related to this recommendation is to minimize program risk and that increasing pay for performance program designs would decrease risk to ratepayers. Overall, implementers and program administrators should be considering which parties are subject to risks of overspending for savings or underperformance of realized savings and how those risks could be minimized. There was clarification that, *in the 3P program context*, “pay-for-performance” refers to paying 3P implementers based on performance (and does not refer to customer incentives or other program design issues).

Next Steps

- Common Spark Consulting will consolidate input collected throughout the Technical Work Group process into a draft report.
- On June 12, from 1:00-2:00pm, Common Spark Consulting will present high-level outcomes in an NMEC Working Group webinar.
- Common Spark Consulting will then finalize the report for PG&E and the CPUC, incorporating final feedback from NMEC Working Group participants.
- Commission staff will consider the report’s recommendations when developing the draft ruleset for population-level NMEC programs.
- Parties will have an opportunity to comment on the draft ruleset on the record before population-NMEC rules are finalized